

REMARKS

Claims 1, 7, 8 and 10 are presently pending in the application.

Claim 1 has been amended to recite that the photoinitiator for cationic polymerization is the only component dissolved or dispersed in propylene carbonate or ethylene carbonate prior to being combined with the other components to form the resin composition, which is supported in the specification at least at page 11, lines 19-21 and at page 13, lines 23-27. No new matter has been added by this amendment, and entry is respectfully requested.

In the Office Action, the Examiner has rejected claims 1, 7, 8, and 10 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner argues that it is not clear what is meant by “the photoinitiator for cationic polymerization is the only component in the composition dissolved or dispersed in a solvent” when all of the components are mixed/combined to form the claimed resin composition. The Examiner is interpreting this phrase to mean “wherein the photoinitiator for cationic polymerization is the only component in the composition dissolved or dispersed in a solvent before it is mixed with the other components to form the resin composition.” In view of the amendment to claim 1, withdrawal of the § 112 rejection is respectfully requested.

The Examiner has again rejected claims 1 and 10 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,776,634 of Ohkuma et al. (“Ohkuma”) in view of WO 02/48101 of Date et al. (“Date”), relying on U.S. Patent Application Publication No. 2004/0030158 of Date as an English equivalent. Further, the Examiner has again rejected claims 7 and 8 under 35 U.S.C. § 103(a) as obvious over Ohkuma et al. in view of Date and further in view of U.S. Patent Application Publication No. 2004/0137368 of Steinmann (“Steinmann”). Applicants respectfully traverse these rejections and the arguments in support thereof for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons that follow, and respectfully request reconsideration and withdrawal of the rejections.

Rejection Under § 103(a) Based on Ohkuma in view of Date

Regarding claims 1 and 10, the Examiner maintains that Ohkuma teaches a photosensitive composition containing a radical-polymerizable monomer, a cationic-

polymerizable monomer, a radical polymerization initiator and a cationic-polymerization initiator. The cationic initiator may allegedly be represented by formula (I), which the Examiner contends is equivalent to claimed formula (I) when Ar is a phenyl group and X^- is a SbF_6^- anion. The Examiner argues that it would have been obvious to utilize the claimed compound based on the teachings of Ohkuma. The Examiner acknowledges that Ohkuma does not teach the claimed purity of the cationic polymerization initiator. However, as previously explained on the record, the Examiner takes the position that it would have been obvious for one skilled in the art at the time of the invention to use the sulfonium salts with a purity of 99% obtained in the process of Date as photocationic polymerization initiators in the composition of Ohkuma.

Finally, the Examiner takes the position that the limitation “wherein the photoinitiator for cationic polymerization is the only component in the composition dissolved or dispersed in a solvent” is interpreted as the state or the property of the photoinitiator for cationic polymerization before it is mixed with the other components to form the resin composition, and that in the resin composition, all of the components are mixed and dissolved. Accordingly, the Examiner concludes that the end product of the present application (the claimed resin composition) is equivalent to the Ohkuma/Date composition, and there are no structural differences between the claimed and prior art compositions. The fact that the resin was obtained with a photoinitiator for cationic polymerization which is the only component in the composition dissolved or dispersed in a solvent does not change the characteristics of the resin, the Examiner concludes. Applicants respectfully traverse this rejection as follows.

According to the presently claimed invention, the photoinitiator for cationic polymerization is the only component dissolved or dispersed in propylene carbonate or ethylene carbonate prior to being combined with the other components to form the resin composition. The proposed combination of Ohkuma with Date does not teach or suggest that only one component is pre-dissolved in a solvent, and also does not teach propylene carbonate or ethylene carbonate. Accordingly, the proposed combination does not teach or suggest all of the claimed elements.

Ohkuma teaches at col. 11, lines 7-8 that “the essential constituents of the present invention and optional additives are dissolved or dispersed in a solvent.” Ohkuma thus teaches

away from dissolving or dispersing only one component in a solvent prior to forming the resin composition as claimed.

Additionally, solvent is used in Ohkuma to facilitate mixing of the components and to improve the coating properties of the composition. The solvent of Ohkuma is intended to be volatilized (by drying) prior to curing. In Example 1 (and all subsequent examples), Ohkuma teaches that the components were dissolved in a 4: 1 mixture of chlorobenzene and dichloromethane to form a solution that was applied on a glass substrate and dried to form a thick film.

In contrast, as taught in the present application, solvent is utilized to dissolve the photoinitiator for cationic polymerization prior to combining it with the other components because such initiators generally occur as solids, and would be difficult to dissolve in the other components. Dissolving or dispersing the cationic polymerization initiator thus facilitates the formation of a homogeneous composition, as well as improving the storage stability and handling properties of the initiator. Alkylene carbonates, such as propylene carbonate and ethylene carbonate, are used in the present invention as solvents due to their favorable properties with regard to toxicity, odor, and low volatility.

A comparison of the toxicity and physical properties of the solvents utilized in the presently claimed invention and in Ohkuma is shown in the following Table:

Toxicity and Physical Properties of Solvents

Solvent	Boiling Point	LD₅₀	IARC Carcinogenicity*
Chlorobenzene	131°C	2.9 g/kg	
Dichloromethane	40°C	1.6 g/kg	2B
Propylene Carbonate	242°C	29 g/kg	
Ethylene Carbonate	240°C	10 g/kg	

*International Agency for Research on Cancer Carcinogenicity Classification

As shown in the Table, the solvents used in the presently claimed invention are fairly non-volatile. Accordingly, it is not necessary to take into account the toxicity by inhalation. That is,

propylene carbonate and ethylene carbonate are considered to be safe solvents due to their high boiling point, low volatility, and low odor.

On the other hand, the solvents utilized in Example 1 of Ohkuma are both volatile and highly toxic. Due to their high volatility, toxicity by inhalation presents a strong concern. The solvents in Ohkuma also have a strong odor.

Accordingly, the presently claimed solvents, which are not taught or suggested by Ohkuma, provide clear advantages in terms of safety relative to the Ohkuma solvents. However, because the solvents used by Ohkuma are intended to be volatilized prior to curing, the claimed solvents would not be appropriate in the invention of Ohkuma, and there would be no expectation of success in utilizing such solvents in Ohkuma.

For at least these reasons, even the proposed combination of Ohkuma and Date would not teach or suggest all of the claimed elements, and reconsideration and withdrawal of the § 103(a) rejection based on Ohkuma in view of Date are respectfully requested.

Rejection Under § 103(a) Based on Ohkuma in view of Date and Steinmann

Regarding claims 7 and 8, the Examiner acknowledges that the proposed combination of Ohkuma and Date does not teach that the composition comprises an oxetane compound and a polyalkylene ether compound as claimed. However, Steinmann allegedly teaches a radiation-curable composition useful for the production of three dimensional articles by stereolithography comprising at least one cationically polymerizing organic substance, at least one free-radical polymerizing organic substance, at least one cationic polymerization initiator, at least one free-radical polymerization initiator, at least one hydroxyl-functional compound, and at least one hydroxyl-functional oxetane compound. Accordingly, the Examiner concludes that it would have been obvious to one having ordinary skill in the art at the time of the invention to add at least one hydroxyl-functional compound, such as propylene glycols of various molecular weights, glycerine propoxylated polyether triol and polyethyleneglycols, and at least one hydroxyl-functional oxetane compound, as disclosed by Steinmann, to the composition of Ohkuma/Date in order to obtain a composition with exceptionally high photo speed, low

viscosity, low humidity sensitivity, and high temperature resistance since such properties are taught by Steinmann. Applicants respectfully traverse this rejection as follows.

As explained above, even the proposed combination of Ohkuma and Date would not teach or suggest all of the elements of the independent claim, and the proposed combination with Steinmann would not cure such a deficiency. Accordingly, reconsideration and withdrawal of the §103(a) rejection based on Ohkuma in view of Date and Steinmann are respectfully requested.

In view of the preceding Amendment and Remarks, it is respectfully submitted that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,
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